

EVALUATION OF VARYING LEVELS OF SUNDRIED CASSAVA STARCH EXTRACT PULP ON SERUM ENZYMES OF BROILER STARTER

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A feeding trial was conducted for four (4) weeks to evaluate the effect of feeding varying levels of sun dried cassava starch extract pulp on serum enzymes of broiler starter. It was carried out at Teaching and Research Farm, Oyo State College of Agriculture and Technology Igbo-ora, Nigeria. Two hundred (200) day-old cobs 500 were randomly allocated to five dietary treatments designated as (T1 (0%), T2 (10%), T3 (20%), T4 (30%), and T5 (40% respectively) of 40 birds each, replicated four (4) times with 10 birds per replicate in a completely randomized design (CRD). At three weeks of feeding trials, 3 ml blood was collected per replicate into plane bottle and transferred to the laboratory for assay, thereafter, it was subjected to statistics analysis. The result obtained showed that there were no significant differences ($P>0.05$) in Aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alanine phosphate (ALP). AST ranged between 175.67 to 189.33U/l, ALT ranged between 19.00 to 26.00 U/l while ALP gave values between 199.00 to 290.33U/l. Conclusively, Sun dried cassava starch pulp can be included to replace maize as source of energy in broiler diets without affecting serum enzyme of broiler. Base on outcome of this study, s Sun dried cassava starch pulp can be recommended to replaced maize up to 40% inclusion levels in the broiler diets and higher level of inclusion of sun dried cassava starch pulp above 40% can be carried out to ensure at what maximum level it can be included in broiler diets.

Keywords: Broiler, cassava starch pulp, serum enzymes, energy and inclusion

Introduction

As cassava starch production increases, a large volume of waste by-product like cassava starch pulp is also generated. Cassava starch pulp is the solid, moist by-product of cassava starch manufacture and comprises approximately 10-15% of the original root weight. The pulp is reported to contain between 1.7-2.8%, 1.6-2.0%, 13.6-27.8 and 0.1% ash, crude protein, crude fibre and ether extract respectively (Khempaka *et al.*, 2014). The fibre of CP exists mainly as insoluble fibre. Suksombat *et al.* (2007) reported 36.7% neutral detergent fibre, 9.8% acid detergent fibre and 3.9% acid detergent lignin in CP. Kosoom *et al.* (2009) The high starch content of cassava pulp would make it a useful alternative energy source for poultry feedstuff. It's extremely low protein, bulkiness, dustiness and high fiber content may be the main factors that currently limit its use in poultry feed. Khempaka *et al.* (2009) reported that although dried cassava pulp can constitute up to 80 g/kg of broiler diets, the higher levels result in decreased growth performance and nutrient digestibility. Therefore, the objective of this study is directed toward investigating effect of varying levels of sun dried cassava starch extract pulp on serum enzyme of broiler starter.

Materials and methods

The experiment was carried out at the poultry unit, Teaching and Research Farm, Oyo State College of Agriculture and Technology, Igboora, Oyo State Nigeria, latitude 7°15'N and longitude 3°30'E with average annual rainfall of 1278mm and average temperature of 27°C (Sanusi, 2011). The fresh cassava starch pulp was procured from Saltry starch processin industry, along Iseyin-Maya road, Oyo State. It was sundried on polythene nylon for 5 days and then taken to the laboratory for laboratory assay. The chemical composition of sundried cassava starch extract pulp was determined in the laboratory by using (AOAC, 2010) method. The metabolizable energy was calculated as described by Puazenga (1985), $(37 \times \text{CP}) + (81.8 \times \text{CF}) + (35.5 \times \text{NFE})$. Nitrogen free extract (NFE) was calculated using the following formula; $100 - (\text{CP} - \text{CF} - \text{Fat} - \text{Ash} - \text{MC})$. CP= Crude protein; CF= Crude fibre; NFE= Nitrogen free extract; MC = Moisture content.

Experimental diets

The birds were given formulated feed from day 1-8 before experimental diets. Thereafter, five diets were formulated having percentage crude protein that ranged between 20.70% - 22.15% with energy ranged between 2893.35ME kcal/kg – 2979.30ME kcal/kg. Maize was the main energy source for the control diet while the other four dietary treatments 2, 3, 4 and 5 was substituted with sundried cassava starch extract pulp at 10%, 20%, 30% and 40% nutrient to nutrient inclusion rates respectively.

Experimental birds and management

The 200 birds were randomly allocated to five dietary treatments, 40 birds per treatment consisting of 4 replicates with 10 birds each in a completely randomized design (CRD). The birds were fed *ad-libitum*. The dietary treatment was at inclusion levels of 0%, 10%, 20%, 30%, and 40% inclusion rate and designated as T1, T2, T3, T4 and T5 respectively. T1 was the controlled diet while the T2, T3, T4 and T5 were maize and sundried cassava starch extract pulp diet.

Statistical analysis

Data collected were subjected to analysis of variance (SPSS, 2012). Means were separated by using Duncan multiple range test of the same software

Table 1: Percentage composition of broiler starter (day 7-5 weeks)

Ingredients (kg)	T1 (0%)	T2 (10%)	T3 (20%)	T4 (30%)	T5 (40%)
Maize	51.00	45.90	40.80	35.70	30.60
SDCSP	0.00	5.10	10.20	15.30	20.40
Soybean meal	35.00	35.00	35.00	35.00	35.00
Maize bran	10.00	10.00	10.00	10.00	10.00
Limestone	1.00	1.00	1.00	1.00	1.00
Lysine	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Premix (B)	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Bone meal	2.00	2.00	2.00	2.00	2.00
Total	100.00	100.00	100.00	100.00	100.00
Calculated analysis					
Energy ME (kcal/kg)	2979.30	2933.09	2919.85	2906.60	2893.35
Crude protein (%)	22.15	21.70	21.37	21.03	20.70
Ether extract (%)	3.43	3.23	3.03	2.83	2.62
Crude fibre (%)	1.53	1.63	1.73	1.83	1.93
Calcium (%)	1.12	1.12	1.10	1.08	1.06
Phosphorus (%)	0.62	0.62	0.62	0.62	0.62
Ash (%)	0.59	0.67	0.61	0.54	0.48
Lysine (%)	1.38	1.33	1.32	1.31	1.29
Methionine (%)	0.63	0.55	0.54	0.53	0.52

SDCSP : sundried cassava starch extract pulp

Result: The results were on Table 3. There were no significant differences ($P>0.05$) in Aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alanine phosphate (ALP). AST ranged between 175.67 to 189.33U/l with least value of 175.33 in treatment five (40SDCSP %) while highest value was obtained in treatment four (30SDCSP%). ALT ranged between 19.00 to 26.00 U/l with least value of 19.00 from treatment five (40% SDCSP) while highest value of 26.00U/l was obtained from treatment four (30% SDCSP). ALP gave values between 199.00 to 290.33U/l, least value (199.00) of ALP was obtained in the treatment five (40% SDCSP) while highest value of 290.44U/l was recorded from treatment three (20% SDCSP).

Table 3: Serum enzyme of broiler starter fed dried cassava starch pulp (0-5 weeks)

Parameters	TI (0%)	T2 (10%)	T3 (20%)	T 4 (30%)	T5 (40%)	SEM
AST (U/l)	176.33	187.00	182.33	189.33	175.67	0.33
ALT (U/l)	21.67	24.67	21.33	26.00	19.00	0.00
ALP (U/l)	247.33	264.67	290.33	230.00	199.00	13.65

a,b,c mean with different superscript in a row are significantly different (P<0.05)

AST= Aspartate aminotransferase ALT= alanine aminotransferase ALP= alanine phosphate

Discussion: AST, ALT and ALP were analyzed to determine the toxicology of liver. The values found in this study were within the normal value reported by Coles, 2007. Thrall *et al.*, 2004 reported that an activity of AST greater than 800U/l indicated an sign of severe liver damage The normal range of AST, ALT and ALP in most birds is between 52 – 270 and 65 – 263 U/l respectively (Coles, 2007). These values can vary considerably according to animal species, sex, age and the environment (Coles, 2007). No significant differences among treatment found in this study and the values were in the normal range for poultry ALT is a more specific criterion of liver disorder than AST since the liver is the main tissue (King, 1965). Therefore, this suggests that sundried cassava starch pulp can be used in broiler diets without causing toxicity.

Conclusion: Conclusively, Sun dried cassava starch pulp can be included to replace maize as source of energy in broiler diets without affecting serum enzyme of broiler.

Recommendation: Sun dried cassava starch pulp can be used up to 40% inclusion levels in the broiler diets to replace maize as energy source.

Higher level of inclusion of sun dried cassava starch pulp above 40% can be carried out to ensure at what maximum level it can be included in broiler diets.

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